

Knowledge and attitude toward coronavirus disease 19 pandemic among Saudi Arabia population: A cross-sectional study

SAGE Open Medicine

Volume 9: 1–8

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DOI: 10.1177/20503121211052421

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Abstract

Background: Coronavirus disease 19 is a pandemic affecting millions worldwide. Since February 2020, new cases are reported in Saudi Arabia, and regulations have been imposed to control the spread of the disease and raise awareness. This study aimed to assess the knowledge and attitudes of the Kingdom's residents toward coronavirus disease 19 during the early stages of the pandemic.

Method: A cross-sectional study of 2071 participants who were recruited from various cities in Saudi Arabia. An online questionnaire was shared through social media, which contained questions about demographic data, general knowledge of coronavirus disease 19, and participants' attitudes.

Results: The mean age of the study population was 34 ± 12.4 years. Most of the participants agreed that coronavirus disease 19 is a pandemic and is more serious than seasonal influenza. More than 90% believed that handwashing and social distancing are effective in preventing disease transmission. No significant results were observed when comparing the knowledge of high-risk participants and the normal population. More than half of the cohort were strictly compliant with curfew regulations, handwashing, and face mask. Around 80% of the population is following coronavirus disease 19 news and information through official authorities' press releases.

Conclusion: The Kingdom of Saudi Arabia residents showed decent knowledge of coronavirus disease 19. Nevertheless, some information needs emphasizing and proper education. Frequent communication between healthcare authorities and the public is highly recommended.

Keywords

COVID-19, awareness, infection control, attitude, knowledge, Saudi Arabia

Date received: 2 December 2020; accepted: 22 September 2021

Introduction

The world is facing a new challenge since the outbreak of a new, rapidly disseminating infectious disease. In December 2019, a case of a patient with a severe respiratory illness was found to be caused by an infection from the coronavirus family, which was called later as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2),¹ and the disease itself was named coronavirus disease 19 (COVID-19). COVID-19 usually presents with fever, cough, lethargy, and shortness of breath.² Other presentations included loss of smell and taste, gastrointestinal manifestations, and others.^{3,4} Unfortunately, no specific treatment has been established up to date. The only guaranteed method is minimizing the spread of the disease by applying strict infection control regulations.⁵

Over the years, the Kingdom of Saudi Arabia (KSA) has adopted a policy of early preparedness to face international emergencies and public health concerns. Successful

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planning vanquished many outbreaks, such as the Middle East Respiratory Syndrome-Related Coronavirus (MERS-CoV), ZIKA, H1N1 influenza, and Ebola virus disease.⁶ To manage the burden of COVID-19, the KSA government has implemented many regulations, including amending curfew, restrictions on air and land travel, and stopping Islamic mass gatherings, such as Umrah and regular prayers in Mosques, including Friday prayer (Muslims' congregational prayer).⁷ These precautions were intended to prevent the transmission of the virus, decrease the load on hospitals, and buy time until more defined management guidelines are published.

The regulations alone will not be enough without community compliance. The Saudi ministry of health (MOH) is spending a massive effort on public awareness through mobile messages, television advertisements, campaigns, and daily press briefings led by regional experts on the number of cases and address concerns brought on by the press. Studies have shown that a person's behaviors are positively affected by the amount of perceived knowledge and perception.⁸ Based on that, expanding community knowledge about COVID-19 may help in decreasing the number of cases.

Studies in the United States and the United Kingdom have shown good knowledge of COVID-19 in general but some misperceptions about preventing disease transmission.⁹ However, the Chinese population has moderate knowledge but a positive attitude toward COVID-19.¹⁰

Few studies have been done to evaluate the knowledge, attitude, and practices of the Saudi population regarding COVID-19 and have demonstrated variable results. These studies have reported that the Saudi population has good knowledge and a positive attitude toward COVID-19 during the pandemic, especially women and higher socioeconomic individuals.^{11,12}

The struggle against COVID-19 in the KSA is still in progress. To overcome this battle, people's commitment to infection control regulations is crucial, and it is obligatory to evaluate public awareness. This study aims to assess the Saudi population's knowledge, attitudes, and practices of COVID-19. The significance of the current study is that it was done after 6 months of the pandemic while restrictions were still in place. At that time, knowledge regarding COVID-19 was rapidly evolving and changing.

Methods

This is a cross-sectional questionnaire-based study from 30 April 2020 to 14 May 2020. The study included the general Saudi population and collected responses from all provinces of Saudi Arabia. Participants younger than 18 years of age and those who did not complete the survey were excluded. The sample size was calculated based on the Saudi population size, and the needed sample size was 385 participants to be 95% confident with a 5% margin of error.

Due to the KSA regulations at that time, face-to-face interviews were not feasible; thus, a convenience sampling

technique was used through an online questionnaire. The questionnaire link was shared online, relying on social media applications, such as Facebook, Twitter, and WhatsApp. The link contained a brief description of the study goals alongside informed consent and declarations of anonymity and confidentiality.

The questionnaire consisted of three parts. The first part included 10 questions about demographic data, such as age, gender, nationality, and household information. The participants were asked about the city of residence; then, in the data entry, cities were divided into large (population more than 300,000), medium (population between 100,000 and 300,000), and small cities (population less than 10,000). The second part intended to obtain insight into the general knowledge of COVID-19 and prevention control methods and included 13 questions. The last part had six questions focusing on the attitude of the public during the COVID-19 pandemic. The complete questionnaire is provided in Supplement 1. The questionnaire was created by an infectious disease expert and reviewed by two experts in infection control and public health for content validity. The study received ethical approval from the Institutional Review Board of King Abdullah International Medical Research Center.

Statistical analysis

The questionnaire responses were reviewed for completeness and accuracy before data entry. The Arabic translation was subsequently back-translated into English. The data were analyzed using STATA 12 software (SPSS program, version 22.0. using descriptive statistics). For the quantitative data, continuous variables in mean \pm SD and median (interquartile range, IQR) were presented for normally distributed data and skewed data, respectively. For the qualitative data, frequency and percentages were presented in tables. *p*-value less than 0.05 was considered significant. All participants were informed that participation was entirely voluntary. In addition, no identifiable information was recorded in the responses.

Results

This study included 2071 participants who have met the inclusion criteria, while 211 were excluded. Of those included, 959 (46.3%) were males and 1112 (53.7%) were females. The mean age was 34 ± 12.4 years, with the youngest being 18 years of age and the oldest 77 years of age. Most of the participants were Saudis (92.1%). Most of the answers came from large cities representing 81% of total responses. The level of education was generally high as 72.3% of the participants were bachelor's degree holders or higher, with 563 (27.2%) being healthcare workers. Almost one-fifth (18.3%) had chronic medical conditions, and 28% reported living with an elderly. Only 73 (3.5%) were isolated as suspected cases of COVID-19, and 35 were tested positive for the virus (Table 1).

Table 1. Participants' sociodemographic data.

| | n = (2071) |
|---|-------------|
| Age (years) | |
| Range | 18–77 |
| Mean ± SD | 34 ± 12.4 |
| Median (IQR) | 30 (24–41) |
| Gender | |
| Male | 959 (46.3) |
| Female | 1112 (53.7) |
| Nationality | |
| Saudi | 1908 (92.1) |
| Non-Saudi | 163 (7.9) |
| City | |
| Large | 1677 (81) |
| Medium | 270 (13) |
| Small | 123 (5.9) |
| Degree | |
| University or high | 1497 (72.3) |
| High school or lower | 574 (27.7) |
| Healthcare workers | 563 (27.2) |
| Participants with chronic diseases | 380 (18.3) |
| Living with people older than 65 years of age | 580 (28) |
| Diagnosed with COVID-19 | 35 (1.7) |
| Isolated as a suspected case of COVID-19 | 73 (3.5) |
| Do you still work during curfew? | |
| Yes, I go to work daily | 518 (25) |
| Yes, I work online | 662 (32) |
| No | 891 (43) |

SD: standard deviation; IQR: interquartile range.

Answers to questions regarding general knowledge about COVID-19 are demonstrated in Table 2. Most of the participants agreed that COVID-19 is a pandemic (92.1%), and 78.9% agreed that it is more serious than influenza. However, 30.8% thought it was dangerous only to the elderly, while 48.9% disagreed. Of the participants, 95.5%, 91.2%, 78.7%, and 60% agreed that social distancing, enforcing curfew, face masks, and hand gloves effectively prevent transmission of the disease, respectively. Moreover, 1923 (92.9%) believed handwashing is an effective preventive measure, and only 27 (1.3%) disagreed. Only 50.07% knew the recommended duration of handwashing was 40–60 s, while others' (41.48%) answers were 20–30 s, and the rest (8.45%) chose 10–15 s.

Regarding COVID-19 symptoms (Figure 1), responders were presented with a list of symptoms and told to choose which are caused by COVID-19. The top three picked answers were cough or shortness of breath (96.6%), fever (89.7%), and sore throat (59.7%). Runny nose was picked the least (25.1%) preceded by diarrhea (31.5%). Body aches represented 50.1% of the answers, and 44.5% chose loss of smell or taste as a symptom of the disease. Headache was chosen by 57.3% of the study subjects, while 45.8% thought chest pain is a manifestation of the disease.

We asked the participants when to test for COVID-19, and the majority (85.4%) answered when contact with a confirmed case of COVID-19. Around 75% chose when experiencing severe respiratory symptoms. When getting flu-like symptoms, anytime, and when contact with a patient with flu-like symptoms was selected by 27.3%, 19.3%, and 18.2%, respectively.

Table 3 compares high-risk participants, who are defined as having chronic diseases, older than 65 years of age, or both, to low-risk populations. For the question “COVID-19 is only dangerous to elderly and patients with chronic diseases,” there was a significant difference with $p=0.019$ (OR 1.251, CI 1.036–1.510). For the remaining knowledge questions, no significant differences were found.

Of our participants, 1897 (91.6%) answered “Yes” for the possibility of a COVID-19 patient being asymptomatic, while 174 (8.4%) answered “No.” A minority (8.8%) are convinced that there is an established specific treatment for COVID-19, while 1888 (91.2%) individuals disagreed with them.

When asked about the attitude toward the COVID-19 pandemic, most of the participants (84.6%) were strictly compliant with curfew regulations, and 289 (14%) replied by “most of the time,” and only 0.4% were not compliant at all. Participants were asked about compliance to handwashing, and most of them were utterly compliant (72.5%), while 22.5% were compliant most of the time, 4.1% sometimes, and 1% were not. Approximately half (58.1%) of the cohort were using a mask in public places all the time, while the remaining were distributed between answering “most of the time” (15.4%), “Sometimes” (11.2%), and “Not at all” (15.3%) (Table 4).

When asked about what to do when experiencing flu-like symptoms, 1243 (60.02%) chose to call the MOH hotline to get advice, 540 (26.07%) will isolate themselves at home and take over-the-counter influenza medications, and 242 (11.69%) will go to a hospital to test for COVID-19, while 46 (2.22%) will not take any action.

When asked what sources they follow for COVID-19 news, official authorities, such as Saudi MOH and World Health Organization (WHO), were the main sources of information for 1658 (80.05%) participants, followed by social media for 292 (14.10%), daily news for 90 (4.35%), and finally friends in 31 (1.5%).

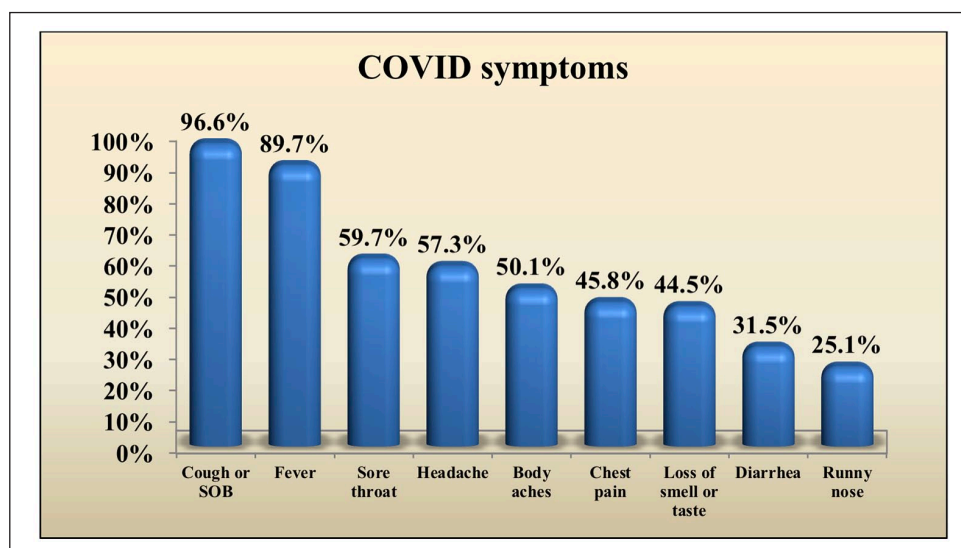
By comparing participants' attitudes between university or higher versus high school or lower degree (Table 5), we found a significant difference in the following COVID news ($p=0.001$) and compliance to handwashing ($p=0.023$).

Discussion

The KSA is no stranger to a debilitating viral outbreak. The relatively recent MERS-CoV outbreak in 2012 is still fresh in the memory of Saudi residents. The Saudi population is facing a battle against COVID-19, and the government

Table 2. Participants' answers to questions assessing the knowledge of COVID-19.

| | Agree | Neutral | Disagree |
|--|-------------|------------|-------------|
| COVID-19 is a pandemic | 1907 (92.1) | 131 (6.3) | 33 (1.6) |
| COVID-19 is more dangerous than seasonal influenza | 1635 (78.9) | 286 (13.8) | 150 (7.2) |
| COVID-19 is only dangerous to elderlies and patients with chronic diseases | 637 (30.8) | 422 (20.4) | 1012 (48.9) |
| Handwashing is effective to prevent transmission of COVID-19 | 1923 (92.9) | 121 (5.8) | 27 (1.3) |
| Social distancing is effective to prevent transmission of COVID-19 | 1978 (95.5) | 75 (3.6) | 18 (0.9) |
| Wearing face masks is effective to prevent transmission of COVID-19 | 1629 (78.7) | 347 (16.8) | 95 (4.6) |
| Wearing hand gloves is effective to prevent transmission of COVID-19 | 1243 (60) | 482 (23.3) | 346 (16.7) |
| Impending curfew is effective to prevent transmission of COVID-19 | 1888 (91.2) | 142 (6.9) | 41 (2) |

**Figure 1.** Answers to the symptoms of COVID-19.

adopted many strategies to increase public awareness of the situation gravity in the hope of aiding preparedness to tackle this pandemic.

To overcome the pandemic, it is vital to analyze its characteristics, such as infectivity, mode of transmission, progression, and lethality from a suitable infection control strategy. Then, public awareness is required to have a good application of such strategies. Measurement of the public knowledge attitudes and practices will help identify areas of weakness that might be improved. Previous experiences have demonstrated that a better perception leads to lower anxiety levels and a healthier attitude toward pandemics.¹³

Multiple studies were conducted on the Saudi population to assess the knowledge of other viral pandemics.^{14,15} In this study, the participant's mean age was 34 ± 12.4 years, which is almost comparable to other studies.¹⁵ Around 28% of the study participants reported living with senior residents who are considered a "high-risk" group to develop a life-threatening disease.¹⁶ The majority of the responses were from large cities, likely due to more population density. This is similar to another study on the same population, where most of the responses were from large provinces.¹¹ However, we had an

equal distribution when it came to gender. Concerning educational degree, our study population included a slightly less percentage of a university degree or higher (72.3%) compared to Alhazmi et al.¹⁷ were postgraduates, and university level made 77.7%. When asked if they were infected with COVID-19, only 1.7% of our respondents were infected, understandable at that pandemic stage and strict regulations, while other studies in Saudi Arabia did not assess the number of infected respondents.¹⁷⁻¹⁹

Most of the participants agreed that COVID-19 is, in fact, a pandemic and is more serious than seasonal influenza. Lacking insight into the gravity of outbreaks and epidemics is highly associated with a negative attitude and increase in cases number as observed before with H1N1 and Ebola.^{20,21} However, it is still alarming that almost a third of the responders believe that COVID-19 is exclusively dangerous to the elderly and patients with multiple comorbidities, despite having reports of mortality in healthy young patients.²² Another study in Nigeria showed that 0.5% only believed that COVID-19 is exclusively dangerous to the elderly.²³ This concept could be due to the focus of health organizations and media on high-risk patients reflecting a

Table 3. Comparing “high-risk” participants (participants older than 65 years of age or with chronic diseases or both) and normal population in general knowledge questions.

| | High-risk participants | | p-value | OR (95% CI) |
|--|------------------------|----------------|---------|---------------------|
| | Yes (n=858) | No (n=1213) | | |
| COVID-19 is a pandemic | | | | |
| Agree | 793 (92.4) | 1114 (91.8) | 0.627 | 1.084 (0.783–1.502) |
| Neutral/disagree | 65 (7.6) | 99 (8.2) | | |
| COVID-19 is more dangerous than seasonal influenza | | | | |
| Agree | 673 (78.4) | 962 (79.3) | 0.633 | 0.949 (0.766–1.176) |
| Neutral/disagree | 185 (21.6) | 251 (20.7) | | |
| COVID-19 is only dangerous to elderlies and patients with chronic diseases | | | | |
| Agree | 288 (33.6) | 349 (28.8) | 0.019 | 1.251 (1.036–1.510) |
| Neutral/disagree | 570 (66.4) | 864 (71.2) | | |
| Handwashing is effective to prevent transmission of COVID-19 | | | | |
| Agree | 787 (91.7) | 1136 (93.7) | 0.094 | 0.751 (0.537–1.050) |
| Neutral/disagree | 71 (8.3) | 77 (6.3) | | |
| Social distancing is effective to prevent transmission of COVID-19 | | | | |
| Agree | 824 (96) | 1154 (95.1) | 0.330 | 1.239 (0.805–1.907) |
| Neutral/disagree | 34 (4) | 59 (4.9) | | |
| Wearing face masks is effective to prevent transmission of COVID-19 | | | | |
| Agree | 675 (78.7) | 954 (78.6) | 0.990 | 1.001 (0.809–1.240) |
| Neutral/disagree | 183 (21.3) | 259 (21.4) | | |
| Wearing hand gloves is effective to prevent transmission of COVID-19 | | | | |
| Agree | 509 (59.3) | 734 (60.5) | 0.587 | 0.952 (0.796–1.138) |
| Neutral/disagree | 349 (40.7) | 479 (39.5) | | |
| Impending curfew is effective to prevent transmission of COVID-19 | | | | |
| Agree | 783 (91.3) | 1105 (91.1) | 0.898 | 1.02 (0.750–1.389) |
| Neutral/disagree | 75 (8.7) | 108 (8.9) | | |

OR: odds ratio; CI: confidence interval.

Table 4. Attitude of the participants toward COVID-19 pandemic.

| | n=(2071) |
|---|-------------|
| Are you compliant to curfew regulations? | |
| Always | 1753 (84.6) |
| Most of the time | 289 (14) |
| Sometimes | 21 (1) |
| No | 8 (0.4) |
| Are you compliant to handwashing? | |
| Always | 1502 (72.5) |
| Most of the time | 465 (22.5) |
| Sometimes | 84 (4.1) |
| No | 20 (1) |
| Are you compliant to wearing face masks in public places? | |
| Always | 1204 (58.1) |
| Most of the time | 318 (15.4) |
| Sometimes | 232 (11.2) |
| No | 317 (15.3) |
| Do you follow COVID-19 news? | |
| Always | 1183 (57.1) |
| Most of the time | 461 (22.3) |
| Sometimes | 328 (15.8) |
| No | 99 (4.8) |

misunderstanding in the public mind in regard to fatalities in young patients. Other studies asked if COVID-19 is more dangerous to the elderly and those with chronic illnesses, most participants agreed.^{24–26}

Many methods to prevent COVID-19 transmission have been suggested, such as handwashing, social distancing, and using face masks and hand gloves. There is no clear consensus concerning some methods leading to different practices, which was noticeable in this study’s results. However, evidence revealed that COVID-19 mainly spreads through droplets in addition to contact with contaminated surfaces and then touching the face, which made hand hygiene the cornerstone of controlling infection spread. Almost 90% of the participants have agreed on the importance of hand hygiene which was in line with Bazaid et al. findings in Saudi populations.^{27,28} In another study in Nigeria and Pakistan, only 62% and 63.8%, respectively, agreed that handwashing was crucial in preventing COVID-19 transmission.^{23,29} Moreover, only half of our respondents knew the recommended duration of handwashing which is 40–60 s, based on WHO and Saudi MOH recommendations.^{30,31}

The concept of social distancing has been proposed to mitigate the spread of COVID-19. Social distancing alone

Table 5. Comparing attitude between university or higher degree and high school or lower degree.

| | Degree | | p-value | OR (95% CI) |
|---|---------------------------------|-------------------------------|---------|---------------------|
| | University or higher (n = 1497) | High school or less (n = 574) | | |
| Are you compliant to curfew regulations? | | | | |
| Always/Most of the time | 1475 (98.5) | 567 (98.8) | 0.665 | 0.828 (0.352–1.948) |
| Sometimes/no | 22 (1.5) | 7 (1.2) | | |
| Are you compliant to handwashing? | | | | |
| Always/Most of the time | 1432 (95.7) | 535 (93.2) | 0.023 | 1.606 (1.067–2.418) |
| Sometimes/no | 65 (4.3) | 39 (6.8) | | |
| Are you compliant to wearing face masks in public places? | | | | |
| Always/Most of the time | 1090 (72.8) | 432 (75.3) | 0.259 | 0.88 (0.706–1.098) |
| Sometimes/no | 407 (27.2) | 142 (24.7) | | |
| Do you follow COVID-19 news? | | | | |
| Always/Most of the time | 1216 (81.2) | 428 (74.6) | 0.001 | 1.476 (1.175–1.855) |
| Sometimes/no | 281 (18.8) | 146 (25.4) | | |

OR: odds ratio; CI: confidence interval.

still lacks solid evidence of its effectiveness, particularly where asymptomatic infections contribute to transmission.³² However, some data support this method if subjects strictly complied with a spatial distance of 2 m.^{33,34} Furthermore, self-isolation and implementing curfew in addition to household social distancing seems a safer option as the risk of COVID-19 carrier exposure is less likely.³² Almost all of our cohort (95.5%) have agreed that social distancing effectively decreases COVID-19 transmission, which is higher than their Pakistani counterpart.²⁹

At the time of writing, the KSA has about 49,176 COVID-19 cases, which is reasonable compared to western countries.³⁵ This study found that almost three-quarters of the Saudi population is compliant to frequent handwashing, in contrast to a very small minority who never abide to hand hygiene. Interestingly, despite 78% of the sample size believing that face masks could prevent COVID-19 transmission, only 58% are wearing them in public places, which is lower when compared to a study on the Chinese population which reported that 97.3% wear masks when going out.³⁶ The reason for this discrepancy is not apparent, but a fair assumption is the inability to obtain face masks in the first place due to shortage at the time of study or not wanting to wear them even if it may help.

Regarding the actions to be done if a person gets flu-like symptoms, a popular opinion (60%) was to call the MOH hotline to get a piece of advice or go to a hospital to test for COVID-19. This behavior is encouraged as early detection and isolation prevent further transmissions. However, almost 26% said they would stay home and take influenza medications, and 2% will not do anything. Compared to their Indian counterpart, 96% of them choose to stay home with no further action.³⁷ This might reflect the education efforts of the

MOH, which provided hotlines and smartphone applications to seek advice and testing arrangements if indicated.

Finally, COVID-19 is still under investigation, and the recommendations are rapidly changing. Time will tell if the implementation of these regulations made a difference. This pandemic will have profound impacts on the field of epidemiology. Comparison between countries and the many approaches taken will prove invaluable to prepare for the next pandemic when it occurs. Until then, policymakers will have to work with uncertainties and conflicting evidence to lead their people through this crisis. Implementing strict regulations may be reasonable to save lives until the complete picture is clear. Not having an established treatment yet put more emphasis on the highest possible infection control measures. Public health awareness is essential in overcoming the COVID-19 pandemic.

Our study was limited by the convenience sampling methods, which may have introduced selection bias. This study's self-reporting might have introduced other biases, such as social desirability.

Conclusion

Most of the participants are aware of the significance of the pandemic and have shown proper adherence to the latest preventive precautions. However, there are some areas of improvement, such as face mask-wearing and education about the correct duration of handwashing. Nonetheless, the MOH efforts are effective in educating the public based on this study's outcomes. We recommend intensifying the awareness programs until the resolution or completely controlling the COVID-19 pandemic.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical approval

Ethical approval for this study was obtained from King Abdullah International Medical Research Center (RJ20/079/J).

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Informed consent

Written informed consent was obtained from all subjects before the study.

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Supplemental material

Supplemental material for this article is available online.

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